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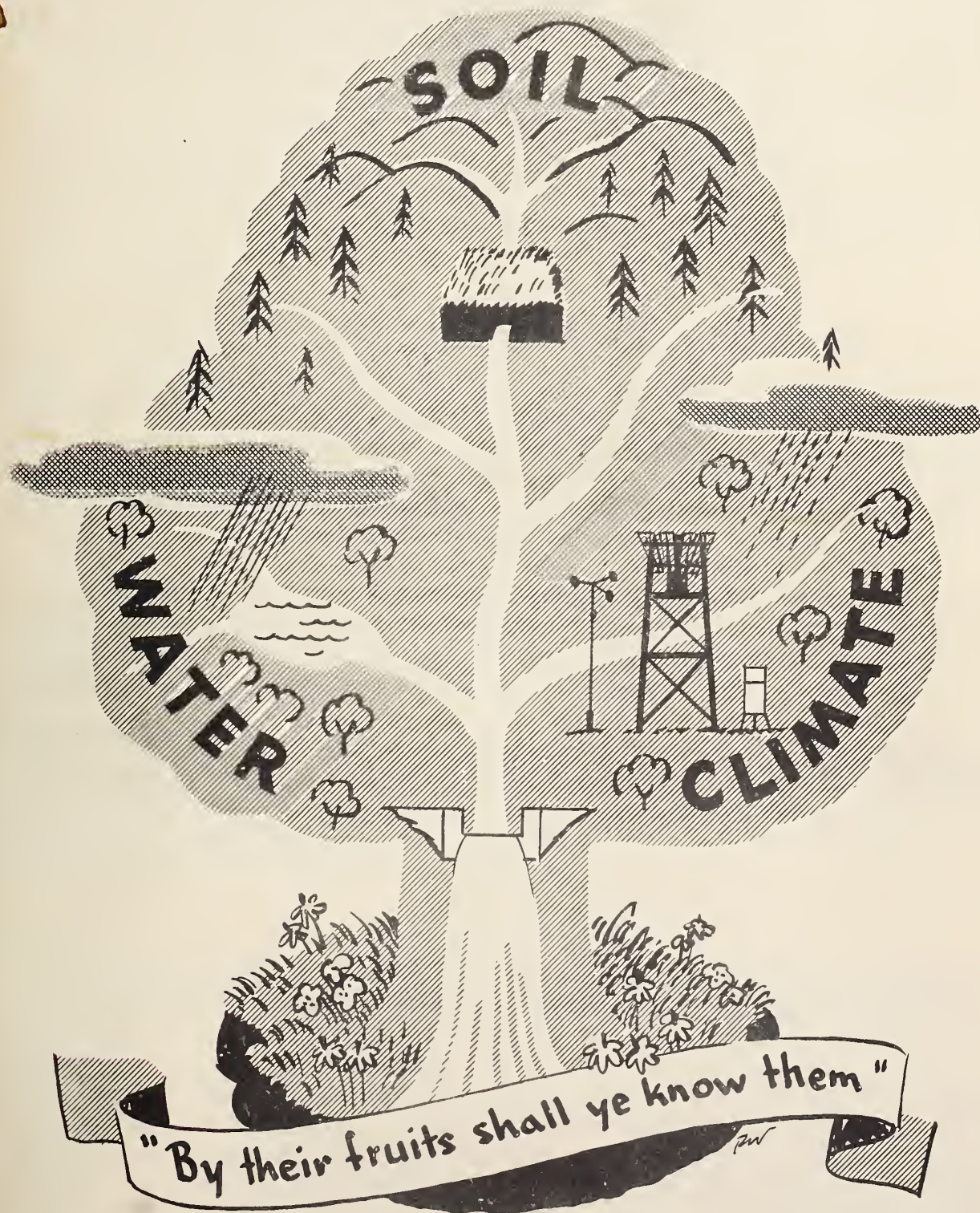


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DIVISION OF FOREST INFLUENCES

Bimonthly Report

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U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

1950

BIMONTHLY REPORT ON FLOOD CONTROL SURVEY ACTIVITIES

California Forest and Range Experiment Station

April - May 1950

The Flood Control Survey Division, in the last two months, continued revision of reports preparatory to final field review by interested State and Federal agencies. The Division assisted in the preparation of material requested by the President's Water Resources Policy Commission for the Central Valley and the southern California drainage basins. One man has been detailed to the Washington Office to assist in drafting the report which will be submitted to the Commission. The Division also participated in a joint conference of the Soil Conservation Service, Forest Service flood control survey personnel, and the Secretary's Flood Control Officer, D. A. Williams, in Portland during the week of May 22.

Advance Studies and Preliminary Examinations

Additional data were obtained on the Rogue, Umpqua, Lewis, and Cowlitz watersheds in the Columbia basin. Available long-time weather records were microfilmed to facilitate use of the data in the Berkeley headquarters. Aerial photo index sheets were ordered for most of the areas to supplement field examinations. Availability and sources of land cover and land ownership data were compiled.

A representative of the Division attended a public hearing conducted by the Corps of Engineers at Roseburg, Oregon to obtain the local views regarding current plans on the Umpqua River. Drafting of base maps for the Lewis and Cowlitz watersheds was started.

Drafting of profiles and cross sections was completed for the catchment basins established last fall on the Stanislaus Experimental logging area. These basins were erected to obtain a measurement of the soil loss on new logging skid trails. Remeasurement of the basins is scheduled for late June or early July.

Current Surveys

1. Wrightwood Area.--This report was discussed with the chairman of the San Bernardino County Board of Supervisors, the Chief Engineer of the Flood Control District, and others to obtain an expression of the county's willingness to assume responsibility for maintenance and operation of the recommended program. The chairman of the Board of Supervisors requested that the report first be considered at the next regular board meeting before the county could indicate its position. At the present time no further word has been received from the County Board of Supervisors. Following the meeting with San Bernardino County officials, this report was also discussed with the State Engineer and his staff.

2. San Gabriel River.--Review of this report by the Soil Conservation Service and the Forest Service at the regional level was completed in April and a corrected draft forwarded to the Washington Office. Following the Portland meeting with Williams further revision was necessary. Changes have been made, and revised pages are being reproduced for insertion in the copies of the report now in Washington. Preliminary draft copies have been sent to the Bureau of Reclamation, Production and Marketing Administration, Agricultural Extension Service, Bureau of Agricultural Economics, Federal Power Commission, and interested State agencies for review and comment. The Corps of Engineers indicated that they had no interest in this report.

3. Santa Ana River.--Additional changes necessitated by the Portland meeting are being completed for the present draft of this report. Preliminary draft copies will be sent to interested State and Federal agencies as soon as the Forest Service and Soil Conservation Service complete their review at the regional level.

4. Santa Maria River.--Reanalysis of the rate of sedimentation in the Santa Maria River channel was completed. Remeasurements in January 1941 of river cross sections initially measured in 1930 indicated an average depth of sediment deposit of .04 foot per year in an 11-year period. Reductions in sediment production rate during a 25-year period due to the recommended watershed treatment program are estimated to prevent losses in channel capacities ranging from 3,000 to 28,000 c.f.s. for discharges of from 20,000 to 100,000 c.f.s. Reanalysis of the program costs and benefits is nearing completion. The preliminary draft of the report is scheduled for review by the Forest Service and Soil Conservation Service early this month.

5. Santa Clara and Ventura Rivers.--Revision of this report was continued during the period to strengthen the program sections.

6. San Diego County Western Watersheds.--Revision of the first draft of this report was resumed to incorporate comments of informal reviews and the results of new reservoir sedimentation surveys. Production and Marketing Administration's agricultural conservation program data were received, which will permit the necessary adjustments in the program measures on agricultural lands.

7. Columbia River Basin Survey.--The Division continued to participate in joint meetings with the three other Stations involved and the Soil Conservation Service in formulating plans and procedures for executing the survey.

a. Willamette River.--Field work was resumed during this period with a small engineering field crew who are engaged in a detailed investigation of sample areas for structural measure determinations. The areas under investigation include the Mohawk River, Thomas Creek, and Crabtree, Marys, and Calapooya Rivers. Surveys of cross sections for damage discharge calculations were made on the Mohawk

River. Tracings were made of reservoir sites in the smaller tributaries of the Willamette based on field work started this spring.

Hydrologic analysis as a basis for evaluating the program was continued. Tests of total annual stream flow on two watersheds--the Molalla and the North Santiam--were made to determine the effects of changes in forest stocking over a period of years ranging from 17 to 30. Recognizing variations in annual precipitation and temperature, a preliminary analysis indicated no detectable increase in flow even with large reductions in forest stocking. No significant effect of the previous years' precipitation on a given year's flow was found. Increases in peak discharges associated with reductions in forest stocking during the period of discharge records averaged 71 percent for the seven watersheds examined. These represent examples of effects and not average effects expected.

- b. Rogue and Umpqua Rivers.--Additional data were compiled and sources of available information recorded.
- c. Lewis and Cowlitz Rivers.--Work on base map was started and basic data on cover types, conditions, and other information listed and tabulated.
- d. Harney Lake Basin.--No work.

Cooperation

A conference was held with Bureau of Reclamation hydrologists to discuss infiltration investigations. The Bureau is initiating infiltrometer surveys on several California watersheds. Their representatives were particularly interested in the areas in which the Forest Service had conducted similar surveys in order that the Bureau might avoid duplicating work in these same areas. Tentative arrangements were made to provide them with information on the condition of wildland areas in those watersheds in which they will conduct infiltration runs. Published soils and other data were provided the Bureau for their use in the present study.

Personnel

Beeson was detailed to the Washington Office to assist in drafting material requested by the President's Water Resources Policy Commission.

1. The first part of the paper is devoted to a general discussion of the problem of the existence of solutions of the system of equations

which are satisfied by the functions $u_i(x, y, z)$ and $v_i(x, y, z)$ in the domain G of the space E_3 . It is shown that the system of equations is solvable in the domain G if and only if the functions $f_i(x, y, z)$ and $g_i(x, y, z)$ satisfy certain conditions. These conditions are expressed in terms of the integrals of the functions f_i and g_i over the domain G .

2. In the second part of the paper

the author

considers

the problem of the existence of solutions of the system of equations in the domain G of the space E_3 . It is shown that the system of equations is solvable in the domain G if and only if the functions $f_i(x, y, z)$ and $g_i(x, y, z)$ satisfy certain conditions. These conditions are expressed in terms of the integrals of the functions f_i and g_i over the domain G .

3. In the third part of the paper

the author considers the problem of the existence of solutions of the system of equations in the domain G of the space E_3 . It is shown that the system of equations is solvable in the domain G if and only if the functions $f_i(x, y, z)$ and $g_i(x, y, z)$ satisfy certain conditions. These conditions are expressed in terms of the integrals of the functions f_i and g_i over the domain G .

BIMONTHLY REPORT OF FLOOD CONTROL SURVEY ACTIVITY

Central States Forest Experiment Station

April - May 1950

Most of the flood control survey activity was concentrated on surveys under the responsibility of the Soil Conservation Service.

Auten and Plass completed office work on the Green River watershed and resumed field work on the Kentucky-Licking.

Schmitt completed office work on the Scioto and commenced field work on the East Fork White-Patoka revision.

Morey wrote the Green River and Scioto forestry appendices and worked with the SCS regional offices at integrating the forestry phases with the open-land program. He also participated in the Milwaukee meeting with SCS, FS, and the Departmental Flood Control Officer.

Personnel detailed from the Northeastern Station prepared a preliminary examination report of the Salt River watershed. Morey made a general reconnaissance of the watershed and adjacent direct drainage.

Status - Flood Control Surveys and Reports

Survey Reports Completed

Green, Ky., Tenn. (SCS). Completed in May.

Survey Reports Undergoing Revision

Scioto, Ohio (SCS). Forest Service participation completed. Draft form of report due in SCS Regional Office June 26, 1950. Mimeographed reports due in Secretary's Office November 1, 1950.

East Fork of White-Patoka, Ind. (SCS). Field work commenced in May. Draft form of report due in SCS Regional Office August 28, 1950. Mimeographed reports due in Secretary's Office February 1, 1951.

Upper Mississippi (above Cairo, Ill.) Ill., Ind., Iowa, Mich., Minn., Mo., S. Dak., Wis. (SCS). As this report will cover the Galena, Root, Sangamon, Whitewater, and Kickapoo watersheds, individual reports for these watersheds will not be revised. Draft form due in SCS Regional Office October 2, 1950. Mimeographed reports due in Secretary's Office March 1, 1951.

Surveys Under way

Kentucky-Licking, Ky. (SCS). Draft report due to SCS Regional Office October 1, 1950. Mimeographed reports due in Secretary's Office January 1, 1951.

Salt, Ky. (FS). Preliminary Examination report undergoing review by SCS. Survey work outline being prepared. Completion date of survey unscheduled at this time.

BIMONTHLY REPORT, APRIL-MAY, 1950

Forest Influences Division California Forest and Range Experiment Station

1. General

High point of the period was an extended field study of brushlands and brushland improvement experiments in woodland and chaparral areas along the western foothills of the Sierra Nevada, the east side of the northern Coast Range, and the hills bordering the Salinas Valley. In attendance were Sinclair, Rowe, Hendrix, Hellmers, Hamilton, Gleason, and Colman of the Station, and Robert Gardner of the Division of Soil Survey, EPIS&AE. Dr. H. H. Biswell, of the University of California, accompanied the group in Madera and Lake Counties, Dr. F. J. Veihmeyer, of the University, played host to us in Shasta County, and Dr. Veihmeyer's assistant, John Sparks escorted us in Monterey County. Each of these men explained on the ground the studies in which he was involved, and there was ample time and opportunity for discussion. Elsewhere, the group met with members of the Station's Range Research staff to see brushland improvement studies carried on under the R&MA program. Members of the local national forest staff joined the party at nearly every study area. This marks the first time that the Influences staff has been in the field together for an extended period. And it was the first opportunity for the group to see and discuss with other workers the important land management researches being conducted outside of southern California. A report on the field study will be prepared.

Sinclair spent April 12 at Henshaw Reservoir in San Diego County where the Vista Irrigation District is preparing to obtain additional water from underground sources in the basin immediately above the reservoir. The District has put down over 200 test wells to determine the elevation of the water table, as well as the depth and extent of water-bearing alluvium in this basin. Artesian flow has been found at several locations, and the existence of a rock mass separating the reservoir from the upper basin has been established. Water table elevations in the basin are above the spillway of the reservoir. This underground basin may well be a larger and better reservoir than Lake Henshaw.

"Operation Pack-Rat", the house-cleaning, property-check, and disposal of surplus material, dug well into the research time of the San Dimas staff during the month of April. Now with the job done the Panbark Flat warehouses are ship-shape once more and everyone is resolved to keep them that way.

The Division assisted in the preparation of watershed information for the Central Valley and the South Coastal Basin of California, in response to a request from the Washington Office. The information is destined for submission to the President's Water Resources Policy Commission.

Charles Kraebel continued his work with the Natural Resources Section, GHQ, SCAP, in Japan. From word just received: "I believe no other 'occupationaire' has pushed into the remote fastnesses (and loose-nesses!) of the mountains as I have during these past months. It has been far more strenuous than an equal amount of travel at home, and I'm glad to call it off and settle down now to writing about it." He is due to leave Japan about June 27, and after a stop in Hawaii will be home about July 22.

Jerry Horton left Glendora April 16 for Fort Collins where he is assisting in the range-watershed survey being conducted on the Roosevelt National Forest. He is expected to be in Colorado until September or October.

Malcolm Furniss, a recent University of California graduate in Forestry, was employed for the period April 21 to June 15, to aid in the soil stabilization work. Furniss assisted Gleason in making the spring examinations of burned areas, and has participated in analysis of erosion and planting data.

2. Current San Dimas Information

a. Weather. In April 2.03 inches of rain fell at Tanbark Flat. The 21-year mean for this month is 2.40 inches. Drizzles in May brought 0.19 inches; the 21-year average for this month is 0.50 inches. As of the end of May the year's rainfall totals 20.66 inches at Tanbark Flat. This total is very close to the average of 20.73 inches for the preceding four years, and 7.49 inches less than the 21-year average of 28.15 inches. The rainfall deficiency on the San Dimas is indicative of conditions throughout Southern California.

b. Streamflow. Flow in all streams of the San Dimas continues at rates far below normal, because of low rainfall.

3. Manuscripts in Preparation

a. Rainfall. Hamilton continued work on the rainfall measurement progress report described in the last bi-monthly report. Portions of the "Rainage Hill" study of rainage behavior were re-analyzed for inclusion in this report.

b. Hydrology. Rowe continued work on "Hydrologic Analysis used in Fire Damage Appraisal" with illustrations of the use of watershed ratings in extending hydrologic data from watersheds with adequate stream-flow records to those with short or incomplete records.

c. Interception. Hendrix completed the first draft of the Rowe-Hendrix paper: "Interception of Rain and Snow by Second-Growth Ponderosa Pine". The paper is now being reviewed by the Influences staff. It is planned for publication in the Journal of Forestry.

d. Vegetation succession. The Horton-Kraebel paper on chamise-chaparral succession after fire is being reviewed by members of the San Dimas staff. Horton's present assignment to the Rocky Mountain Station and Kraebel's to Japan will delay revision of the paper after review.

4. Papers Completed

a. "San Dimas Rainfall and Wind Velocity Recorder" by E. L. Hamilton and L. A. Andrews. This paper, described in the last bi-monthly report, has been completed and is being submitted to the American Meteorological Society for publication.

b. "Effect of Weed Competition upon Survival of Planted Pine and Chaparral Seedlings" by J. S. Horton. This paper, described in the last bimonthly report, has been completed and is ready for publication as a Station Research Note.

c. "Disposition of Rainfall in Two Mountain Areas of California" by P. B. Rowe and E. A. Colman. This paper is in the Department of Agriculture review mill.

d. "Water Research in the Field of Brushland Improvement" by E. A. Colman. This paper was prepared for and presented at the April meeting of the California State Board of Forestry. A portion of the meeting was devoted to discussion of the controversial problems regarding brushland improvement for forage production and water yield. The paper described the hydrologic processes that may be affected by conversion of brush to grass. These are: infiltration, erosion, interception, and evapo-transpiration. It then presented the results the Experiment Station obtained in its studies of brush burning at North Fork and explained these results in terms of the hydrologic processes which had been described. The paper emphasized the need for obtaining more information regarding these processes as well as rainfall, soil, and vegetation characteristics throughout the brush zone of the State.

5. Current Research

a. Streamflow. Compilation and correction of San Dimas streamflow records were continued.

b. Lysimeters. Considerable defoliation of chamise has taken place both inside and outside the lysimeters. We do not yet know the reason for the defoliation nor how seriously the shrubs have been injured. New shoot growth has been noted on many of the plants.

c. Soil-moisture instrument. The laboratory calibrations of fiberglas soil-moisture units in cores of undisturbed soil have progressed through three drying cycles from about field capacity to below wilting point for this soil. The results show that laboratory calibrations obtained by this method are in good agreement with the soil moisture-electrical

resistance relations previously established by field sampling.

A revision of the "Manual of Instructions" for the soil-moisture instrument has been prepared. The only major change has been the recommendation that soil units be calibrated in undisturbed soil cores. The revised manual will be available within a month.

Some time ago the Station found that resistances were running considerably higher than expected in the latest batch of soil units manufactured by the Berkeley Scientific Company. The resistances were so high that they ran off the scale of the meter while the soil under test was still above the wilting point. Investigation showed that the cases were some 0.02 inches thicker than specified. The manufacturer has now re-built the dies used to form the case, and we believe that the problem has been solved. If any agency finds that it has been sold soil units unusable from this cause, we suggest that the manufacturer be notified and replacements requested.

d. Plant physiology. Seed of Pseudotsuga macrocarpa that had been stratified for 1 month was planted in Anorthosite and Lowe Granodiorite soils. Stratification was tried because previous plantings in these soils failed to germinate. The treatment resulted in an improvement of germination, and the seedlings will be ready for treatment with fertilizers the first part of June.

Preliminary germination studies were carried out on Arctostaphylos glauca, A. glandulosa, Eriodictyon nigrescens, and Adenostoma fasciculatum. The results on the Eriodictyon corroborate earlier findings that the clipping of one end of the seed results in germination. However, because the seed is very small this is a tedious task, so other methods of improving germination are being investigated. These include cold treatment similar to that already given to seeds of Arctostaphylos species. Seeds of Arctostaphylos as well as Adenostoma were sent to Dr. Jonas, University of California, Berkeley, for radiation using diathermy for internal heating. The seeds have been planted but no results are available to date.

The small and medium lysimeters at Tanbark Flat were prepared for study of transpiration and plant competition. Forty-five of the small lysimeters were planted to 9 species of plants, leaving 27 blank for use this fall in case it is desired to study grasses. Twenty of the 30 medium lysimeters were planted to mixtures of the 9 species of plants. Species used included: Adenostoma fasciculatum, Eriogonum fasciculatum, Ceanothus crassifolius, Pinus coulteri, Pseudotsuga macrocarpa, Quercus chrysolepis, Q. dumosa, Rhus ovata, and Spartium junceum.

e. Soil Stabilization in Burned Watersheds. Four burned areas of 1948 and 1949 in southern California were examined by Gleason and Furniss to note the growth of sown and resident vegetation, and to record erosion. The burns and their treatment are as follows:

<u>Burn & NF</u>	<u>Year of Fire</u>	<u>Treatment</u>
Wheeler Springs Los Padres	1948	Mustard sown in fall of 1948 over large area. Grasses and mustard sown in small plots
Green River Cleveland	1948	Mustard sown in fall of 1948 over large area. Grasses and mustard sown in small plots
Middle Fork (Lytle Creek) San Bernardino	1949	Mustard sown in fall of 1949 over large area. Grasses and mustard sown in small plots
Haskell Canyon Angeles	1949	Grasses and mustard sown in small plots

First-year observations on the Wheeler Springs and Green River burns of 1948 were given in the Station's annual report for 1949 (p. 55). In the spring of 1950 the mustard in considerable areas of these burns had yielded its dominance to a heavy volunteer growth of resident herbs and brush. Annual ryegrass (Lolium multiflorum), which had given the best first-year results of all grasses sown, had reproduced with great density but showed no appreciable invasion of unsown areas. In contrast to the first winter, wind erosion was nil. Water erosion was inconsequential this year in the Wheeler Springs burn, but active in the Green River burn where stream channels remained choked with post-fire debris and watershed slopes were frequently gullied. In Black Star Canyon, Green River burn, channel excavations made in November 1949 showed the volume of deposits to range from more than 850 cubic yards per mile of channel in the upper tributaries to approximately 10,000 cubic yards per mile along the lower main channel. In the spring of 1950 the amount of debris in the channels was not measured but it appeared to be greater. This debris is in transit to Santiago Reservoir, an important source of irrigation water in Orange County.

Watershed slope erosion in upper Black Star Canyon during the winter of 1949-50 was calculated from gully measurements at 38,000 cubic yards per square mile.

Debris eroded from a 14 square mile section of the Green River burn was measured in the Sierra Canyon debris sump at more than 90,000 cubic yards per square mile of watershed. This is the total debris delivery for the first two winters after the fire, as calculated from measurements obtained by the California State Division of Forestry. By contrast, observations of the channel bottoms in adjacent Harding and Silverado canyons, both unburned for many years, showed no evidence of erosion in the last two winters.

In the Middle Fork burn of 1949, mustard sown by airplane had generally good distribution, although some missed areas were seen. Below about 4500 feet altitude the mustard stature and density were good; at higher altitudes the plants were scattered and depauperate, owing to cold weather. Of the several grass species tested in this burn, annual ryegrass grew best.

In the Haskell burn plots, mustard sown at 4 pounds per acre, and annual ryegrass sown at 10 pounds per acre, gave the best growth of all species tested. All the sown species were sparse and depauperate, owing to cold weather, and an extremely inhospitable site.

f. Vegetation development. The vegetation on the undisturbed runoff-and-erosion plots at Tanbark Flat was charted. At North Fork (Sierra National Forest) vegetation on the runoff-and-erosion plots was charted for the first time since the study there was discontinued in 1940. Some of these plots had been burned nearly every year between 1929 and 1938, and the vegetation on them had been charted each year during this period. It was charted again this year to provide information on vegetation development after repeated burning, such information being of particular interest now in connection with the problem of brushland improvement.

6. Meetings attended:

April 13. Colman attended the April meeting of the California State Board of Forestry, at Davis. Many aspects of brushland and range improvement were discussed by representatives of the University of California, the Forest Experiment Station, and other agencies. Colman's paper (see under Papers Completed) followed one by Professor Veihmeyer of the University of California. Dr. Veihmeyer reported results of his studies of brush burning in northern California, and ended his paper as follows:

"By way of summary, it may be stated that the moisture properties of the soil in these experiments have not been adversely altered by burning. In any case in the unburned plots all of the available soil moisture was exhausted. On the other hand, on these plots where the brush was replaced by herbs and grasses all of the soil was not reduced to the permanent wilting percentage, and water was left in storage in the soil in the fall. Under such conditions burning will result in the saving of water and, at the same time, in the production of forage. Runoff and erosion have not been accelerated in the areas where these experiments were conducted and burning should not be condemned, at least for these localities."

April 18-19. Hamilton attended a field meeting of the Supervisor's Staff and District Rangers of the Sierra National Forest. The keynote of the meeting was "what can we do to improve our management of Forest watersheds." The meeting included a field trip through Jose Basin and then to the Bretz Mill burn. A session was held at Trimmer the second day to

discuss items noted on the field trip.

April 18. "Water for Today and Tomorrow" was the subject of a talk by Gleason to the Conservation Section, American Association of University Women in San Francisco. Kodachrome slides were shown, and copies of the pamphlet "Know Your Watersheds" were distributed.

April 20. Gleason repeated his April 18 program before the Sierra Chapter, Daughters of the American Revolution, in Berkeley.

April 22. Colman took part in a field meeting in Madera County conducted by Dr. H. H. Biswell of the University of California. Dr. Biswell has been studying the conversion of woodland and chaparral to grass in this area for several years. He has advocated two burns about 3-years apart as a method for killing brush and seedlings that appear after the first burn. The studies are not far enough along to demonstrate the adequacy of this treatment. The meeting was attended by about 25 people including ranchers and representatives of various county, state, and federal agencies.

April 26-27. DeMott, Hamilton, Rowe, and Sinclair attended sessions of the American Society of Civil Engineers' meeting at Los Angeles on the 26th, and DeMott attended on the 27th. The programs covering consumptive use of water and underground storage were of special interest to our group.

May 9. Colman discussed snow research problems before the Neptune Club of San Francisco. The members of the Club are water engineers associated with such organizations as the Federal Power Commission, Forest Service, Bureau of Reclamation, Geologic Survey, and Southern Pacific Railroad.

May 12. Colman took part in Dr. Biswell's field meeting on the Kiethley ranch in Lake County. Here much of the brush is chamise and the land is used for sheep and deer range. Fire followed by very heavy browsing has been effective in killing the brush in some places. In others the tender brush shoots growing after burning provide important browse for sheep and deer. The meeting was attended by over 50 people, representing the same groups as did the Madera County meeting of April 22.

May 18-19. Wyckoff, Talbot, Sinclair, and Colman attended the meeting of the California State Board of Forestry at San Bernardino. All took part in discussions of water use by wild-land vegetation. Here, as at the April meeting, there was much discussion of brushland improvement. Members of the State Division of Forestry presented erosion information obtained with our cooperation on the Green River burn. (see Current Research: Soil Stabilization in Burned Watersheds)

7. Cooperation.

a. Hal Roach Motion Picture Studio. As a public service the Hal Roach studio with assistance from County, State, and Federal forest agencies in southern California is making a fire prevention film stressing watershed protection. A production crew of three men from the Studio accompanied by Mr. Taylor of the State Division of Forestry visited the San Dimas Forest on April 10 in search of locations for specific "shots". Hamilton guided the group into San Dimas and Big Dalton Canyons.

b. Union Oil Company. On April 12 Rowe discussed the influences of vegetation, soils, and geology upon water yield with Eugene Bovax, Geologist, Union Oil Company, Los Angeles.

c. University of California. Plans are being made for the University to use Tanbark Flat camp facilities for a class of 40 students in entomology during a 5-week period starting in June. Dr. MacSwain, who will be in charge of the class, inspected our camp on April 16, accompanied by Sinclair.

d. Los Angeles City Department of Water and Power. Messrs. C. H. Graham and D. G. Campbell conferred with Rowe on April 25, concerning the geologic phases of the water yield study being conducted by the Department in San Fernando Valley.

e. Board of Agriculture and Forestry, Territory of Hawaii. Hamilton supplied a tipping bucket rain-gage mechanism, and the model of a double-action electric water stage transmitter to Mr. Colin Lennox, President of the Board. The instruments were loaned as models for the construction of similar ones for use in connection with watershed studies in Hawaii.

f. California Region, USFS. In late May, the Regional Forester received from the Senior Canyon Mutual Water Company, of Ojai (Los Padres National Forest), an application for a special use permit to allow spraying riparian vegetation with 2,4-D in an effort to increase the summer water flow in Senior Canyon. Water Company records showed that the flow in the summer of 1949 had been considerably greater than in the several summers before denudation of the watershed by the Wheeler Springs fire of 1948. It was the desire of the Company to perpetuate this gain by killing the riparian vegetation before it could become re-established. The area to be sprayed included some Federal land along with Company-owned land.

The Influences Division was consulted with regard to the probable effects of spraying upon plant growth and water flow, and as to research possibilities in connection with the project. It was decided that the spraying should be permitted but that no formal research should be conducted because of the lack of time for planning an adequate experiment, and the lack of adequate experimental controls. Results of the spraying

are to be noted by administrative personnel, and observations will be made as possible by the research staff in connection with other work in the vicinity.

8. Visitors

April 11. Dr. T. S. Coile, Forest Soils Laboratory, Duke University, was guided over the San Dimas Forest by Sinclair.

April 15-16. Conservation Committee of American Legion Post #13, Pasadena, visited the San Dimas Forest, and spent the night at Tanbark Flat.

April 20. Dr. Phillips, of Pomona College, and a class of 16 students in plant ecology were guided over the San Dimas by Hendrix.

April 25. Jerry S. Olson, University of California graduate student in soils, visited the San Dimas Forest, guided by Hendrix.

April 28. Lowell A. Rich of the Southwestern Station stopped at Glendora to discuss with Hendrix the calibration of soil-moisture instruments.

May 3. M. Xavier T. B. deMegille, Agricultural and Forest Engineer from Algeria, visited the San Dimas.

May 13. The Pasadena Conservation and Outdoor Education Committee of the Pasadena City Schools was guided over the San Dimas by Sinclair. There were 15 in the group including Jack McNutt, Assistant Forest Supervisor of the Angeles.

May 17. Dean F. S. Baker of the University of California Forest School, accompanied by Wyckoff, Talbot, and Colman, visited the San Dimas. The group spent the night at Tanbark Flat.

May 23. Mr. Sharon Weitz, nursery and forest planting operations officer from Israel, accompanied by Hyman M. Goldberg, forester I & E, Region 9, were conducted over the San Dimas by DeMott.

May 24. Dr. M. Zohary, Head of Department of Botany, and Daniel Zohary, Ecologist, both from Hebrew University, Jerusalem; Mr. Alfred Avram, Secretary, Israel Association of Field Crop Growers, Haifa, accompanied by Gus Juhren, were conducted over the San Dimas by DeMott.

BIMONTHLY REPORT
Division of Forest Influences
June 15, 1950.

Washington Office

During the past two months, activities have centered around furnishing information and assistance to the Water Resources Policy Commission (in addition to Munns' own contribution as a "detailer"), reviewing manuscripts and flood control survey reports, and carrying out a seemingly ever-larger number of multitudinous activities necessary to meet our particular responsibilities.

Statements have been prepared for the Water Resources Policy Commission on such diverse items as watershed management objectives, the relative effects of land use and development on the water resources, the effects of land use on ground water supplies, etc. Various Divisional members have been called upon to participate in drainage basin reports for the Commission. These included R. W. Beeson, California; Herb Storey, Sid Weitzman, G. L. Varney, Northeastern; H. G. Meginnis, Southern; Henry Lobenstein, Intermountain. One of the results of the Commissions' work is the educational opportunity provided as agency representatives arrive at common understanding on many technical matters.

The Division has been participating in staff review of the Forest Service portion of the Department river basin reports prepared for the Water Resources Policy Commission. While these reports were prepared under considerable pressure and on short notice, they contain much valuable information. This material will be helpful in preparing the National Plan for Management of Wildland Watersheds.

One recent controversial question has arisen as to the effect of land use on ground water supplies. The Water Resources Policy Commission has requested information on this subject. The Conservation Foundation is also studying it with the view of describing the over-all ground water supply situation in a report for which Munns is serving on the board of review. Conflicting statements have been made. In the opinion of one group land use has no effect. For proof, evidence is cited that records of streamflow and wells have shown no significant changes during the gaging period. Our view is that land use, by affecting the movement of water into and through the soil, affects positively ground water recharge and supplies. Then, too, gage records do not cover the period during which major changes in land use occurred.

Rowe and Colman's manuscript, Disposition of rainfall in two mountain areas of California has been returned to the Station along with comments of the board of review. The manuscript was generally well received and with only minor changes should be ready for publication.

Flood control survey reports came in for their share of time and attention. The Boise report is about ready for submission to the

(Over)

Secretary's Office. The San Gabriel has cleared this office and has been submitted to the Staff. The Santa Ana is now being reviewed in this office. The Division is also assisting in the review of several Soil Conservation Service reports. These include the Pee Dee and Sny, previously approved by the Forest Service, and the Russian (Cal.), Green (Ky.), Bosque (Tex.), Lower Arkansas, Grand, and the Little (Tex.).

The recently enacted 1950 Flood Control Act gave leadership responsibility to the Engineers for preparing a comprehensive flood control report on the Arkansas-White and Red River Basin. The President has directed the Corps of Engineers to collaborate closely with affected departments. Conferences are now being held to determine the manner and extent of U.S.D.A. participation. The Forest Service will have a share in this, adding another big task to the Flood Control Survey organization and to the whole Forest Service. One might guess that another Interagency Committee will be set up for the basin. If so, we may desire to request further postponement of the Colorado comprehensive survey.

Lassen accompanied Don Williams, the Department's Flood Control Survey Officer, to a series of meetings at Philadelphia, New Orleans, Milwaukee, Ogden, and Portland, to explain new flood control policies. Flood control personnel in the field appear to be well satisfied that the new policies will enable a more rapid completion of reports which have been hanging fire for several months.

The Roosevelt National Forest range and watershed study is under a full head of steam. Stream gaging stations have been installed in the two watersheds on the allotment selected for intensive study and infiltrometer runs are underway. The work plan calls for completion of the study so that initial results will be available by November 1. Forty infiltrometer runs will be made on the two watersheds. They will be divided evenly between early and late season runs; the 20 early runs to be completed by July 15. The Rocky Mountain Division has developed highly efficient techniques for operating their infiltrometer equipment. F.C.S. Units and others will be interested in the Station paper by Dortignac, which will give details. One of the striking features of the area is gully cutting of the meadows, primarily from poor road drainage. Mrs. Mary Nash of the Washington Office has been detailed to Fort Collins to provide stenographic assistance. Lull visited the project.

A sufficient number of copies of the bimonthly report are sent to each Station to provide a copy for the Division Chief, one for each research center at which influences work is carried on, and two for each flood control survey unit. Should this be an insufficient number to get the reports into the hands of the Divisional personnel, that should be called to our attention. Where the bimonthly report conflicts with a Station's quarterly report, the Station is sending in the Divisional bimonthly report and using the same material for quarterly reports. Just as soon as the routine is established, it is assumed no great delays in submitting material will occur.

Recent books include, Western Land and Water Use, by Mont Saunderson (Univ. Okla. Press), and Social Costs of Private Enterprise, by William K. Kapp (Harvard Press). Both are "musts" for Influences personnel, the latter, especially, for those engaged in the economic aspects of watershed work.

BI MONTHLY REPORT ONFOREST INFLUENCES AND FLOOD CONTROL SURVEYS

June 1, 1950

FOREST INFLUENCES

DELAWARE BASIN RESEARCH CENTER

by I. C. Reigner

Delaware-Lehigh Experimental Forest

The deficiency in streamflow at the Dilldown watershed as previously reported at the end of February was entirely made up during March. Rainfall was high for the month, totalling 6.07 inches. All snow was melted by the end of the month. Thus, the total amount of precipitation, plus the snow stored at the end of February, was available for streamflow.

As a result, a record discharge was recorded for March, amounting to 4.92 inches. A daily record was established on March 28, with a discharge of more than 5 million cubic feet--39.6 million gallons.

In addition, groundwater levels rose to a peak at the end of March, averaging about 10 feet higher than a year previously.

April, on the other hand, was a month of rather low rainfall, only 2.53 inches. Streamflow remained high, although the discharge data are not yet available, but the water table dropped about 9 feet by the end of the month. This is further evidence that the groundwater storage capacity is not great in this area.

Pocono Experimental Forest

Precipitation during March and April was similar in amount to that at Dilldown, but during May was about 0.8 inch less than Dilldown, following the trend reported previously. From October 1 to the end of May, the total difference amounts to 3.5 inches.

Considerably more snow was recorded at the Pocono than at Dilldown and it remained in evidence a few weeks longer in the spring. By the end of March, snow was all gone at Dilldown while at the Pocono it still averaged 14 inches. Snow lasted until the second week in April.

Scrub Oak Conversion

Site preparation and planting was completed on approximately 50 acres lying immediately outside the Dilldown watershed area. This project supplements the previous experiments on scrub oak conversion and was made to determine costs on a relatively large area. The site was prepared by a D-7 Caterpillar with a tilted bulldozer blade. The blade cut a wide, shallow furrow in the soil, providing a place in which to plant and at the same time removing scrub oak competition. To prevent erosion and accelerated runoff from the planting area, the furrows were run as close to the contours as possible. In addition, the furrows were broken at intervals averaging approximately 75 feet. Planting of five different species was accomplished by an adaptation of the mattock-slit method.

The Pennsylvania Department of Forests and Waters provided the tractor, seedlings, and planting crew. W. E. McQuilkin was in charge of the project with additional technical assistance provided by the Anthracite and Delaware Basin branches.

The same species were used to plant two 1-acre plots to which plant poisons were applied last year. Planting was done with a planting bar directly through the humus and root layer. Difficulty in planting was encountered because of the root mat and the concentration of rocks immediately beneath the soil surface.

Fire

The worst fire season in recent years was experienced this spring in the vicinity of the Delaware-Lehigh Experimental Forest. Weather conditions causing high fire danger, together with the urge for more blueberries, resulted in a number of wild fires dangerously close to the watershed area. Finally, on May 14, a fire jumped the fire lane and burned approximately 78 acres of watershed land before being suppressed.

Fortunately, little damage was done. The experimental plantings were not touched and one installation within the burn, a soil moisture

sampling site, came through without damage. The fire was light, burning ground vegetation and the surface 1/4 inch of litter and humus. Apparently compaction caused by normal activity around the installation prevented burning in this area.

Bethlahmy, together with Burnham and McQuilkin of the Anthracite Branch, assisted State personnel in suppressing the fire.

Frost

Bethlahmy spent a day at State College, Pa. conferring with Dr. Bramble and William R. Byrnes, a graduate forestry student. Mr. Byrnes had previously voiced his interest in making a laboratory study of frost as a subject for his master's thesis.

Bethlahmy outlined previous work on the frost problem and suggested a controlled laboratory experiment as another step in learning the complete frost picture, and several preliminary investigations requisite to the conduct of the experiment.

Considerable interest was shown and it is hoped that the preliminary investigations and at least part of the problem will be undertaken by Mr. Byrnes.

While at State College, Bethlahmy also discussed techniques of making a study of infiltration rates with another graduate student, and interested Dr. Bramble in our soil-moisture studies. Dr. Bramble plans to purchase a Colman meter and soil-moisture units.

Other Activities

Reigner spent part of the period at Schoharie Reservoir in New York State taking part in a sedimentation survey conducted by the Soil Conservation Service.

Schoharie Reservoir is one of the two reservoirs in the Catskill division of the New York City water supply system. Excessive siltation was reported in this reservoir and since an all-out effort is being made to provide New York City with more water, the survey was made to determine the present capacity of the reservoir, the amount of original capacity lost by sedimentation, and an estimate of the future usefulness of the reservoir at the present rate of siltation. The more serious deposits were located and an attempt will also be made to locate the sources of the sediment.

The survey was headed by Ross E. Rogers, sedimentation specialist from the Fort Worth, Texas, office of the Soil Conservation Service.

Sediments throughout the reservoir were measured by taking a large number of samples with a special instrument devised for this purpose. The sediment-measuring device, or "spud", is dropped from a boat at a designated sample spot. It penetrates the sediment and enters the original soil. A sample of the soils encountered is then brought up with the spud, allowing a depth measurement of the sediment.

Computations on the survey are now in progress and the results will be reported when available.

Herb Storey spent most of the last 2 months at the Washington office helping to write reports for the President's Water Resources Policy Commission.

Ned Bethlahmy returned late in April after receiving his degree of freedom from the statistical course given at the Washington office.

MOUNTAIN STATE RESEARCH CENTER

By Sidney Weitzman

The Director and his staff met with research center personnel and discussed the proposed working plan for the initial watershed management studies on the Fernow Experimental Forest. The discussion developed the following points:

1. To go ahead immediately with the construction of stream-gaging stations on four subwatersheds and one control watershed.
2. After a period of calibration, the four subwatersheds would be used for testing the hydrologic effect of four levels of management from poor to high order.

The measures and treatments for each cutting-practice level were selected from among those that a review of the literature and experience indicate are appropriate to the level of cutting practice assigned. Although concerned primarily with watershed management, these studies also include some aspects of timber management. (Other compartments on the Fernow forest deal directly with timber management.) Thus, the response of each treatment in water quality and quantity may be compared with the silvicultural and economic advantages of the same cutting-practice levels. In that way timber management and watershed management will be tied together in one comprehensive study.

The specific watershed objectives of these studies are to determine:

1. The effect of each treatment level on water quality and quantity.
2. The effect of each treatment level on base flow and peak flow.
3. The effect of cutting cycle on water quality and quantity.

In conjunction with the timber management phases of the study, these watershed-management studies will indicate:

1. The relative merits of each cutting-practice level for both timber and water.
2. Where the income from timber management may have to be sacrificed for watershed management.

3. The minimum practices acceptable where watershed management is the primary purpose.

The conference also developed some of the watershed factors deserving study in the future. There are several other small watersheds available for investigating the hydrologic effect of these variables. These include:

1. Amount and character of forest cover.
2. Character and lay-out of logging roads, skid roads, etc.
3. Road and skid road after care.
4. Grazing of domestic livestock.
5. Forest fires.

As we progress with our research program, other factors may assume greater prominence.

Installations

The initial installations of four experimental and one control watershed are under construction. It is anticipated that the total installation will be completed by June 30.

Stream flow will be measured using 120° V-notch control. The conventional rain gages, station recorders, and weather stations will also be installed. Water-quality determinations will be made at regular intervals. Silting traps will be constructed on those watersheds where treatments may involve heavy sediment loads during storm periods.

Visitors

Dr. Harper, Arthur Bevan, Herbert Storey, and Lem Miller composed the reviewing staff for the watershed-management working plan. They spent April 16 and 17 at the Fernow Experimental Forest.

Mr. Warwick Doll, district engineer of the U. S. Geological Survey, spent May 23 on the Fernow Experimental Forest inspecting the installations.

FLOOD CONTROL SURVEYS

By Arthur Bevan

GENERAL

No outstanding floods occurred in the Northeast this spring. Extremely low average temperatures were experienced during April and May. The number of cloudy days with some snow or rain was unusually high; May was within one day of equalling the all-time record. Stream-flow in general was above normal, with a few minor floods occurring on very low-lying bottom lands. Groundwater recharge has been excellent. Most wells outside of heavily pumped aquifers are substantially above normal.

Favorable weather with a higher percentage of runoff than usual has caused spill from both of the Catskill reservoirs of the New York water supply system. Croton reservoirs at the end of May had 83 per-cent capacity; with continued favorable runoff they should spill soon. All restrictions on water use in New York City have been removed.

FLOOD CONTROL SURVEY ACTIVITIES

Activities have been largely confined to revision of the Connecticut report. Data on current USDA programs has been collected, adjusted, and revised to obtain realistic figures on accomplishment. The program and its costs have been revised and discussed with cooperating agencies. The report is now being put into final draft form.

Data on going programs in the Merrimack watershed were collected at the same time as for the Connecticut. The Merrimack report will follow the Connecticut. The Allegheny, Monongahela, and Upper Susquehanna reports will follow in the order named.

In accordance with instructions, work was started on the Salt River watershed in Kentucky. Central States Station will have primary responsibility for this survey but the Northeastern station will provide the personnel. A working arrangement between the Stations for carrying out this project has been agreed upon.

In connection with our participation in SCS surveys, work on the Delaware report is nearing completion. Zerbe and Trimble have been assigned to this project. Late in May we received a draft of the Roanoke Report from SCS, Spartanburg, with a request for Forest Service assistance in revising this report. The deadline for completion is August 1, 1950.

June 1, 1950

NORTHERN ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

Bi-Monthly Report, Division of Flood Control Surveys

April - May 1950

The work of the Division of Flood Control Surveys of the Northern Rocky Mountain Station for the months of April and May has been concerned mainly with the current snow melt. This spring offered unusual opportunities for studying and observing snow-melt conditions and behavior.

Record snow packs occurred at most of the established snow courses in the Upper Columbia area, exceeding those of both 1948 and 1949. Forecasts by the Soil Conservation Service and the Weather Bureau warned of expected maximum water flows and high flood peaks. With a delayed spring season, the flood threat increased. However, late May continued with warm, thawing days, cool nights and little or no precipitation, so that by June 1 the flood potential had greatly decreased.

Late Season Readings Taken on Established Snow Courses.

The last regular readings on established snow courses are taken near the time of maximum accumulation, generally April 1 or May 1, depending on the location. Since Flood Control Surveys is concerned with the progress of snow melt as well as maximum accumulation, cooperative arrangements were made with Region One personnel whereby post-season measurements were taken on some 25 courses on May 15 and June 1, and a final reading is scheduled for June 15. The attached table, "Comparative Measurements For a Few Selected Snow Courses in Upper Columbia Basin," shows the water content at given dates for the years 1948, 1949 and 1950.

Continuation of Studies at Priest River.

Simultaneous measurements of local climate and snow melt, at several stations in a gaged watershed, under various conditions of cover, aspect and elevation are being made to further determine the effect of these conditions on snow accumulation and melt. Measurements of the streamflow resulting from the snow melt are being made in a continuing effort to relate peaks, timing and volume of streamflow to the snow pack and rate of snow melt.

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Region-wide Observations on Snow Conditions and Streamflow are Being Made.

A series of observations are being made throughout the Region during the melt period. Routes of travel were laid out to give as wide an area coverage and to observe as many conditions as possible. An attempt has been made to cover each route at least every two weeks. Observers are making notes on snow accumulation and melt by types of cover, by aspect and by elevational zones. Wherever possible, observations are being made at the same site or in the same general locality on each trip, so that definite progress of the melt can be measured. Sample points were set in a variety of locations and actual measurements are being made of snow depth and water content. Observers were cautioned to note any peculiar or unusual conditions seen. Notes are being kept on streamflow, and definite points have been established for noting periodic water level, rate of flow and turbidity. Bank and channel cutting and similar stream disturbances are being recorded and further study of these areas will be made at a later date. Whenever the streams show a sediment load, the observers are instructed to determine the sediment sources, if possible. These will also be subjected to special study in the future. Notes are being made on frost and soil moisture conditions and their apparent relation to observed surface runoff.

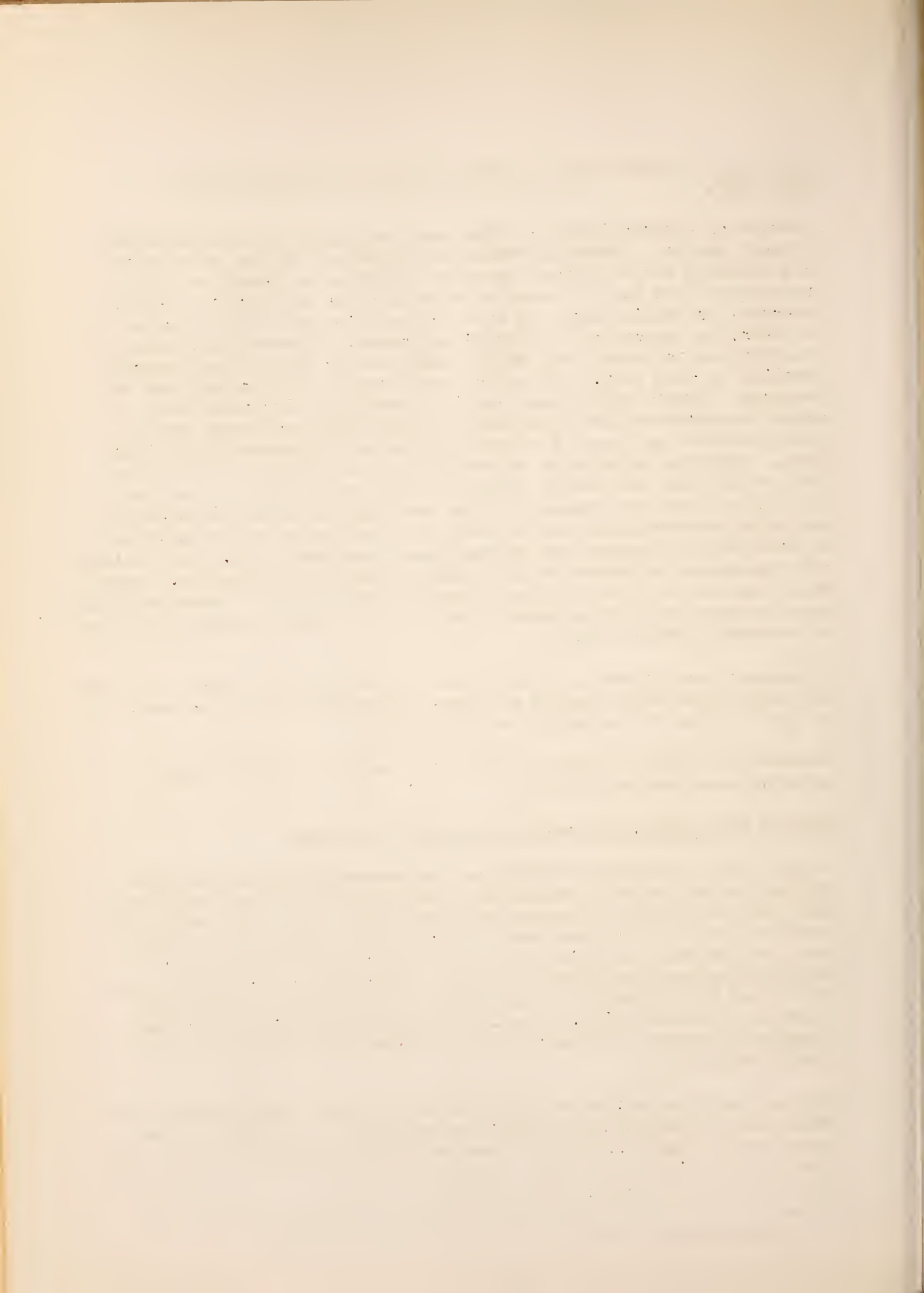
Throughout their travel, observers are contacting local forest officers and other interested persons to secure their ideas on the progress of the melt and the normality of streamflow.

Observations will be continued until the end of the melt period, probably sometime in mid-June.

Special Snow Study, "Operation Snow Pack," Underway.

In late April it became obvious that an abnormally large snow pack existed in the Columbia headwaters. Water content of snow pack was more than 200 percent of normal in many places. The April melt which usually carries off a considerable part of the snow water had been much smaller than usual in many areas. Many May 1 readings were actually greater than those of April 1. Forecasters predicted rapid runoff and high potential flood peaks. If men could be stationed right in the snow fields, a wonderful opportunity existed for continued measurement and observation of anticipated unusual snow and runoff conditions.

Through the joint effort of the Division of Flood Control Surveys and Region One, "Operation Snow Pack" was organized. At each of three locations, a team consisting of one man from the Region and one from Flood Control Surveys has been located to make continued observations, measurements and records until the end of the melt. In addition to measuring snow conditions, their men also are securing records of wind, temperature, humidity, precipitation and sunshine.



Choosing the locations was a matter of some difficulty. The sites had to have some kind of habitable quarters; must be within snowshoe striking distance of a considerable variety of cover, aspect and elevation conditions; preferably should be located within the drainage having a heavy snow pack and, ideally, should be located above a stream gage so that the melt could be followed down the stream.

The three points finally chosen were: Liz Butte Lookout on the Clearwater drainage, Banfield Lookout on the Kootenai, and Marias Pass on the headwaters of the Flathead River. At the Marias Pass location, the men were invited to share quarters with the Corps of Engineers men at the Upper Columbia Snow Laboratory. Here it is possible to adapt some of the Corps' installations to F.C.S. purposes; other installations were made in the general area to measure specific conditions not otherwise covered.

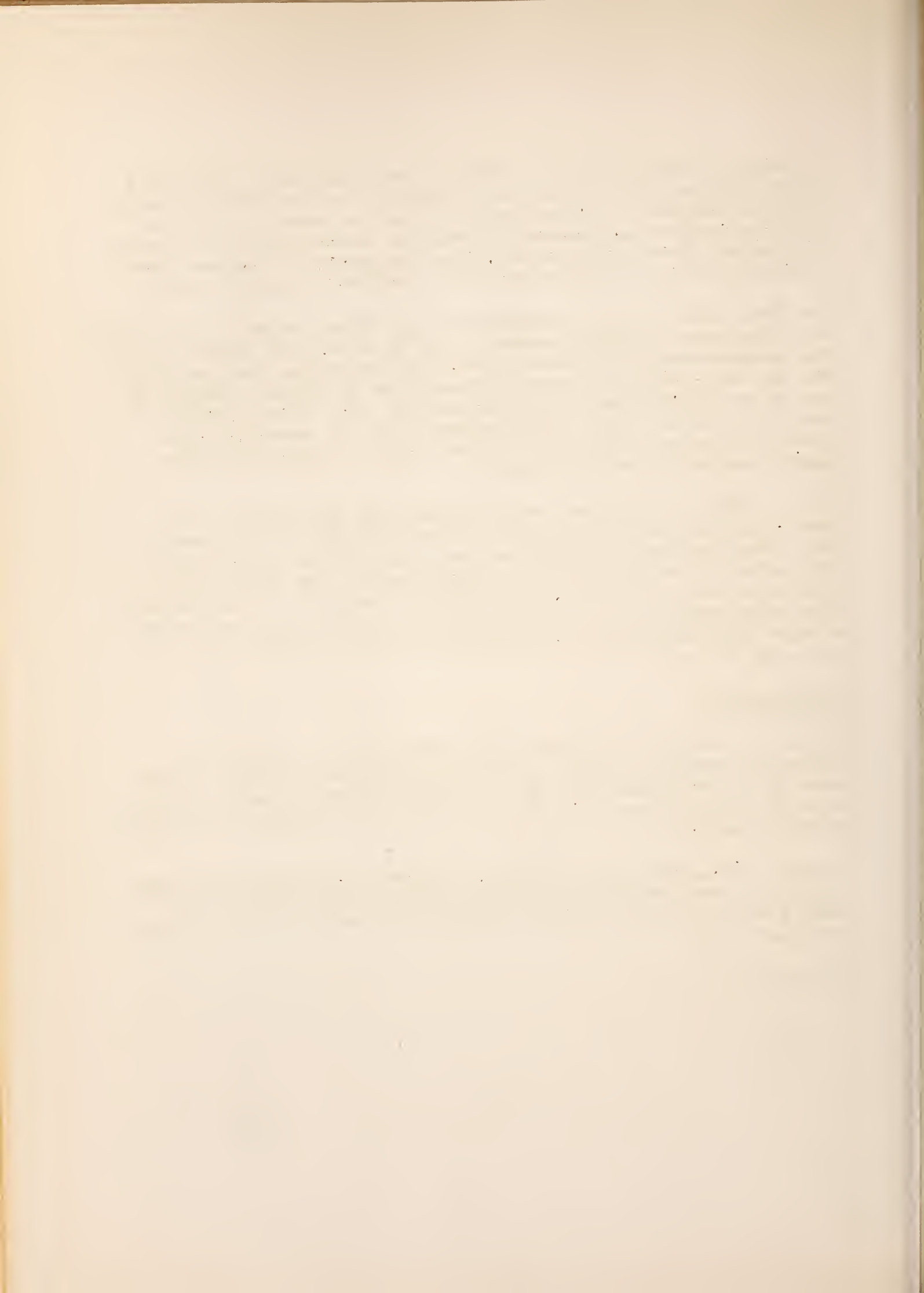
The two lookout points are some distance from any regular travel routes, and it was necessary for the men to travel in by snowshoe. Their camp equipment and supplies are being dropped by parachute and contact is maintained by short wave radio. The first group of observers moved in on May 3, the other two on May 8. It is probable that these stations will be manned until mid-June. Whether or not a major flood develops, it is certain that much valuable information is being obtained.

Miscellaneous

Routine attendance at meetings and planning for the summer field season has gone on as usual. Two meetings of special significance were the flood control meeting in Portland during the week of May 22 in which Don Williams participated and the CBIAC meeting at Kalispell on May 9 and 10.

Richard Alvis, GS-5, Soil Scientist, reported for duty in late May. Alvis is a transfer from the SCS in North Carolina and replaces Lowell Belnap, who was fatally injured a few weeks ago in a toboggan accident.

Attachment



COMPARATIVE MEASUREMENTS FOR A FEW SELECTED
SNOW COURSES IN UPPER COLUMBIA BASIN

Name of Snow Course	Elevation-Ft.	Watershed	Average May 1 prior to 1950		Water Content in Inches					
			Yrs. of Record	Water Content in Inches	1948	May 1 1949	1950	May 15 1949	1950	June 1 1949
Strawberry Lake	6500	Flathead	1	35.5	*	35.5	58.9	*	60.0	5.0 43.8
Trinkus Lake	6500	"	1	36.5	*	36.5	53.1	*	52.1	2.4 39.0
Desert Mountain	5600	"	13	9.0	14.9	10.8	21.7	0.0	18.7	* 5.2
Skalkaho Summit	7200	Bitterroot	12	21.9	26.7	24.8	33.5	14.4	35.4	* 23.0
Packers Meadow	5700	"	13	12.7	22.0	24.7	24.3	2.0	21.2	0.0 0.65
Gibbons Pass	7100	"	14	18.6	21.3	22.9	28.3	*	29.1	* 23.9
Baree Mountain	6000	Kootenai	13	37.7	47.2	50.1	68.1	40.8	66.1	27.4 58.3
Bluebird Basin	6800	"	11	33.8	*	36.7	53.7	24.3	49.1	15.0 42.3
Forty-nine Meadows	5000	St. Joe	11	25.0	35.2	37.0	47.5	21.5	39.4	4.8 26.8
Boyer Mountain	5200	Pend Oreille	2	21.1	*	16.1	28.8	3.1	19.2	0.0 4.1
Mosquito Ridge	5110	"	11	26.4	34.6	34.1	47.0	*	43.3	* 26.0
Benton Spring	4900	Priest River	13	12.4	20.6	20.4	26.1	0.0	18.6	0.0 8.2
Lookout Pass	5250	Coeur d'Alene	12	19.0	34.8	21.4	45.1	15.6	38.0	* 22.7

* No measurements made

PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION

Bi-Monthly Report, Division of Flood Control Surveys
April-May, 1950

All activities of the Division were on the Columbia River survey and related work, including planning for the comprehensive agricultural program.

Direct Survey Work

A survey base map of the Columbia Basin Area has been finished and copies distributed to the survey work groups, the USDA Advisory Committee, and others.

Field work on land condition soil surveys for the southwest Washington area has been completed. These observations show the soils to be deep and of medium texture over most of the area. On the west side, cutover areas are restocking fairly well; but in the higher parts on the east, restocking is poor. The streams show considerable bank cutting, and sediment deposits are frequent along the lower channels. It does not seem likely that a flood-control program will be justified here; but extensive tree planting under the comprehensive conservation program is desirable and would have some flood-control benefits.

In the soil-frost study, observations on snow melt under different stand densities extended beyond the scheduled terminal date in mid-April. Hale is now writing a progress report. As a summary of the findings, there was no soil freezing in the Cascade mountain forests in winter and spring, but some discontinuous soil freezing in the lower woodland range types after the snow melted. On open range, the soil froze before snow fell and remained frozen until mid-March. The greatest depth of frozen soil-- $7\frac{1}{2}$ inches--was found on a range area with sparse vegetation and compacted soil. The observations on snow at Wind River showed on April 21, 38 inches of snow in the clearcut area, 33 inches in the heavy thinning, and 26 inches in the virgin old growth; on May 15, no snow in the clearcuts, 6 inches in the heavy thinning, and 11 inches in the virgin stand; on May 24, no snow at any of the sites checked.

Office work in collecting and tabulating hydrologic data continues, and is about half done for our whole work area.

The staff recently added R. L. Hobba to the hydrology section, by transfer from the Southern Station Flood Control Surveys.

With Anderson of the California group, Wilm has been working out a modification of Anderson's hydrologic analysis technique which is to be submitted to other work groups for their consideration (and perhaps adoption).

Supplementary Studies

Bullard has developed the rough draft of a working plan for forest-influences studies at Blue River. Studies planned include the effects of different silvicultural systems and logging methods on total water yield, seasonal stream flow fluctuation, water quality, snow accumulation and melting rates, soil moisture, and soil erosion; techniques for proper road location, provision of adequate road drainage, and cut and fill slope stabilization; trials of plant species for soil stabilization and erosion control; and observations on changes in the forest and streams as game and fish habitats.

Sartz and Hale are planning soil studies to determine water storage capacities and percolation rates. A series of samples will be taken for testing from each major soil group over our work area, using techniques and equipment developed by the Northeastern flood-control surveys.

Coordination

A preliminary working plan for the flood-control survey has been drawn up from drafts submitted by the technical committees. Wilm and other members of the Columbia Basin comprehensive agricultural program interim committee have finished a tentative draft of the working plan for the comprehensive program. This plan is being submitted to the USDA Advisory Committee for review and comments.

A meeting of representatives of all the Columbia Basin FCS work groups was held May 25-26. Flood Control Officer Williams from the Secretary's office acted as chairman. Interpretations of directives and policy statements were discussed and clarified; the relation of the flood-control survey to the comprehensive program was explained; and the comprehensive working plan was reviewed briefly.

Nelson met with the Forest Service Columbia Basin Coordinating Committee on May 15-19 in Washington, D. C., to outline plans for the forest and range section of the comprehensive program. He reports an interesting session, with action agreed upon to develop regional and interregional standards for program measures, and to develop standard data collection forms and procedures. A detail advantageous to flood control is the decision to use teams combining national forest administration and flood-control survey men for collecting data from the various field offices. Thus comprehensive program needs, including those of flood control, can be integrated with administrative requirements and data on going programs smoothly and quickly, on a coordinated and standardized basis.

Even at this early stage of work, much progress has been made toward weaving the needs of flood and erosion control into a well-organized agricultural program. The work ahead provides an exceptional opportunity for joint cooperative effort among the various agencies of the Department

of Agriculture. Obviously, building the necessary cooperation will be a long, slow job because of the widely varied interests of the people and bureaus involved. But if it can be done successfully, this work should do much toward knitting the field men of the Department into a closer-integrated agency working for the interests of farm and forest people in the Columbia Basin area.

June 1, 1950

BIMONTHLY REPORT
April 1 to May 31, 1950
Forest Influences Division
Rocky Mountain Forest and Range Experiment Station
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The activities of the Forest Influences Division during the months of April and May were curtailed by the assignment of L. Dudley Love to the Roosevelt Study on April 15, and the period of time spent by E. J. Dortignac on the construction of the weirs and the setting up of the infiltration study experiments at the Manitou Experimental Forest.

Forest Influences Division - Fort Collins

During the week of April 3-7, the watershed management activities of the Experiment Station were presented by Love to the annual Region 2 Supervisors' Meeting in Denver. The following items were covered graphically and by discussion:

1. Storm analysis of Missouri Gulch, Manitou Experimental Forest--the kinds of storms, conditions producing runoff, storm runoff, and application of material to watershed treatment programs.
2. Range-watershed studies of the pinyon-juniper type in western Colorado--condition classes, infiltration and erosion indices, and application of material to watershed treatment programs.
3. Water yield studies at the Fraser Experimental Forest--brief summary of results of water-yield studies, and Jury recommendations for treatment of Fool Creek.

In mid-April the Division was called upon to assist in the preparation of basin reports for assembly in the Washington Office where they were recast for the President's Water Resources Policy Commission. Considerable effort was put into these reports, since they concerned the watershed aspects of three important basins--the Colorado, Arkansas-White, and Rio Grande. Region 2 and the Rocky Mountain Station are vitally concerned in all three. Present research activities and future plans and requirements for research were discussed in detail.

Despite the limitations on time and personnel, the going activities at Fraser Experimental Forest and Manitou Experimental Forest were maintained. The cooperative snow investigations conducted in conjunction with the Bureau of Reclamation are being continued at Fraser Experimental Forest under the direct supervision of Harry E. Brown. Influences projects at Manitou Experimental Forest are being directly handled by T.W. Hansen. A large part of Dunford's time has been required in the general guidance of these two programs. The Forest Influences program on the Western Slope is functioning smoothly under Dortignac's direction.



The Rocky Mountain Station was honored by a visit on May 16-18 from Professor A. W. Bayer, in charge of the Botany Department, University of Natal, Union of South Africa. Dr. Bayer was primarily interested in the vegetation of the Front Range and its effect on runoff, erosion, and related watershed characteristics. Dr. Bayer visited both the Fraser Experimental Forest and the Manitou Experimental Forest during his stay in Colorado. The contact proved to be very stimulating to the personnel of the Forest Influences Division. It was particularly interesting to note the similarity of problems between our Front Range country and those with which he is working in South Africa.

Manitou Experimental Forest - Front Range

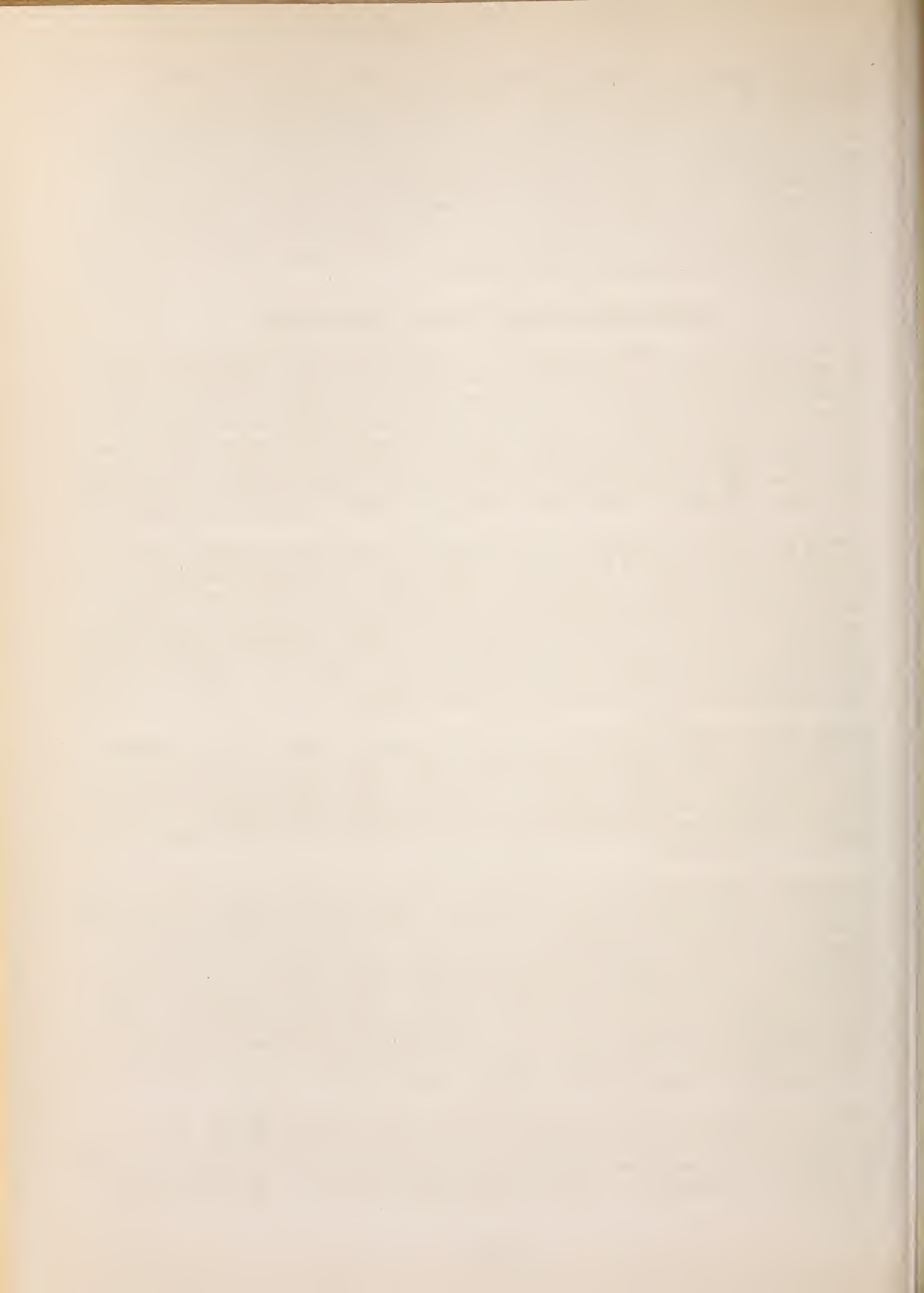
In early April the gaging station on Missouri Gulch was opened after one of the driest winters on record at Manitou Experimental Forest. A large accumulation of ice had to be cut away before the gage could be set in operation. Spring runoff proved to be very low because of the lack of stored moisture. Almost no snow had fallen during the winter period and the usual spring peak was almost nonexistent during late April and early May. Snow and rain received during the month of May was barely sufficient to satisfy the soil-moisture deficiency and storm flow was negligible.

During May the crew assigned to the watershed management phases of the Roosevelt Study sampled three main cover types in the Missouri Gulch drainage in the effort to associate infiltration rates with known storm runoff rates for given storm periods. Approximately 10 pairs of samples were taken in each of the three major cover types. Dortignac spent 2 weeks assisting in this project, and Dunford about 5 days. The results gained will be useful not only to the Roosevelt Study, but also in future research work contemplated for the Missouri Gulch drainage.

In mid-April another attempt was made to propagate aspen by root cuttings in two of the small 1-acre watersheds. This year half the root cuttings were treated with a root hormone to stimulate sprouting and the other half were untreated. Limited success was achieved during the summer of 1949 after planting aspen root cuttings without any treatment and under rather difficult climatic conditions.

During May preparations for the summer season at Manitou were made and plans for two new small-scale projects drawn up. The first of these is study of weekly soil moisture changes on the small ponderosa pine watersheds now being subjected to type conversion treatment. The immediate objective of this study is to determine, by weekly measurements, the fluctuation in soil moisture in the first 18 inches of soil. These are intended to give the week-by-week changes caused by evaporation and transpiration and will also record the reaction of the soil to precipitation which is added at intervals throughout the summer period. The plan calls for the sampling of the 18-inch soil depth in two segments: 0-6" and 6"-18".

The second project is one designed to study the consumptive use of soil moisture by various grasses useful for reseeding purposes. Here it is hoped to determine the water consumption of smooth brome, crested wheatgrass, intermediate wheatgrass, and the native Arizona fescue. Use will be made



of 18 small lysimeter tanks originally intended to sample the depth of moisture penetration and the retention of precipitation by Pikes Peak granite. The study will be exploratory in nature and intended only to point the direction for future work. A volumetric measurement will be made of the water applied to the grass species in order to determine at given periods throughout the summer months the amount of moisture which is used. It will also give an opportunity to test the Colman soil moisture meter under our conditions.

During the last week of May the initial phases of the study were begun. Soil was removed and mixed and then replaced in half of the lysimeter tanks and during this operation Colman units were placed at 6-inch and 15-inch depths. The other half of the plots were simply cultivated, the weeds removed, and following this, grass was planted in all tanks. Nine are 18 inches deep and the remaining nine are 36 inches deep. Water is collected from the surface by runoff tubes and percolation water is collected from the bottom of the lysimeters by drain tubes.

Fraser Experimental Forest - Continental Divide

The cooperative snow investigation study conducted jointly by the Forest Service and the Bureau of Reclamation is in its last season. Particularly strenuous efforts have been made during the snow-melt season this year to assure adequate and continuous records. A new innovation was developed by the Bureau of Reclamation to insure longer life of the storage batteries which operate the Esterline-Angus recorders. Records of wind movement at both the 1/60-mile and 1-mile intervals are being made by this recorder from towers located in a forested area and an adjacent open area. Wind movement is measured at the snow surface, and 25-foot, and 47 $\frac{1}{2}$ -foot levels in both sites. In addition, wind direction is being measured by a recording wind-direction indicator. Supplementary measurements include recorded temperature and humidity, and snow-course measurements taken once a week. In the spring of 1950 an effort was made to study intensively the rate of snow-melt at the wind tower site. A detailed map was drawn and areal snow distribution is mapped at 3-day intervals. It is hoped that from this we may draw some conclusions as to the influence of surrounding vegetation, topography, aspect, and other factors on the rate of snow-melt.

The detailed study of rate of snow disappearance is being supplemented by a more extensive survey of the entire St. Louis drainage. This area of 33 square miles is being viewed from several vantage points at weekly intervals and snow cover is mapped on an overlay using an aerial mosaic as a base. The intention is to supplement further the data now being obtained in the cooperative snow investigations to determine, for the purposes of forecasting, the time and location of snow disappearance. The overlay map is being supplemented by numerous pictures taken from the vantage points at weekly intervals.

In line with the recommendations presented to the Rocky Mountain Station by the Fool Creek Jury, a beginning has been made in determining the influence of south slopes on snow melt. In an exploratory study, snow measurements have been taken on two slopes, one facing due south and the other north. An equal number of snow samples have been taken at weekly intervals on



each aspect. Snow accumulation during the spring period has been measured by four standard gages on each of the two slopes. In a further effort to determine what happens to the moisture on south slopes, soil pits have been dug under the melting snow to determine the depth of moisture penetration. It was found in many cases that water appeared to be flowing downslope at depths of 2 to 3 feet below the surface of the ground. Flow ordinarily was taking place in a rather pervious sandy layer. At the time water was observed flowing in pits on the south slope, the runoff from Fool Creek which faces mainly north and east was showing no sign of daily fluctuation in the stream. Soil pits dug on the north slopes tend to bear this out because some ice and frost was noted in the upper layers of soil and no observable movement of moisture was taking place in the lower layers.

During the month of April the entire program at Fraser was given a considerable boost by the assistance of Mr. Fred A. Bertle, Civil Engineer from the Bureau of Reclamation. His main purpose in visiting Fraser was to learn the rudiments of the cooperative snow investigations and to maintain the instruments involved. At other times Mr. Bertle gave valuable help in the general program.

Western Slope Research Center - Delta, Colorado

Influences work at the Western Slope Research Center was temporarily halted during half of the period with the assignment of E. J. Dortignac to the Roosevelt Study on April 20. During the Roosevelt detail, two stream-gaging stations were installed, a Rocky Mountain infiltrometer assembled, and calibrated, field tests started, and computations completed for the calibration and field runs.

Activities conducted at the Western Slope Center included:

Spring-fall pinyon-juniper range

Small pinyon-juniper watersheds on Black Ridge were inspected during the spring snow-melt season. Several watersheds in spring-fall range are being considered for study of the effect of cattle grazing on surface runoff and erosion. Practically no surface runoff occurred during this period of melting snow. A negligible amount of surface runoff was contributed from a road crossing the watersheds. The soil was not frozen when inspected even when bared of vegetation.

Red Sandstone experimental watersheds

Red Sandstone watersheds were visited on April 17-19 and on May 13-14. All three stations were placed in operation in April and only one gage failed to work satisfactorily. Calcium chloride solution and oil were lost during the small rises on April 21-22 and water in the stilling well froze to a depth of several feet.

Stream flow on May 13 was lower than during the same period of the two previous seasons. Unless unseasonably warm weather prevails, the peak flow should occur later than the May 21, 1948, and June 16, 1949, crests. The effect of commercial logging on stream flow is beginning to show up. About



40 percent of the timbered area in watershed no. 3 has been cut-over, which apparently caused the difference in stream flow between watersheds during the April 21-23 snow-melt period. The crest flows in second-feet per square mile of watershed were:

<u>Watershed</u>	<u>Day 1</u>	<u>Day 2</u>
1	0.8	0.9
2	0.8	0.7
3	2.2	4.7

The Sacramento snow storage gage, located below no. 3 gaging station, failed to catch all of the snowfall as judged by snow core measurements taken around the gage. These indicated only a 70-percent catch, not including melting and sublimation losses from the snow mantle after November 29. The catch during the previous winter was considerably better.

The past three seasons' record of snowfall measured in the Sacramento snow storage gage:

	<u>inches</u>
1947-48 (Oct. 1 - Apr. 22)	17.55
1948-49 (Oct. 1 - Apr. 29)	20.25
1949-50 (Oct. 1 - Apr. 18)	17.50

Water content and depth of snow near the storage gage for the past two seasons:

	<u>Snow depth</u>	<u>Water content</u>
	<u>inches</u>	<u>inches</u>
April 29, 1949	46.3	17.9
April 18, 1950	44.5	17.5

Publications, reports, study plans, reviews

During the latter part of May the final preparation for publication of Goodell's paper entitled "A Trapezoidal Flume for Gaging Mountain Streams" was made. This will appear as Rocky Mountain Forest and Range Experiment Station Paper No. 2, dated June 1950. It contains the details of a laboratory test of a new-style stream-gaging design and the examples of how a prototype can be worked out for any small mountain stream.

Dortignac has reworked and submitted for final station release a paper entitled "Design and operation of Rocky Mountain infiltrometer." This paper will provide explanation and the operation of new developments made in this instrument. He also reviewed critically the proposed publication by Rowe and Colman entitled "Disposition of Annual Rainfall in Two Mountain Areas in California." He has also prepared for future release a Research Note entitled "Calibrating sharp-crested rectangular weirs with a velocity-head rod."

Study work plans prepared during the 2-month period are as follows:

Dortignac, E. J., and Turner, G.T. April 1950. Evaluation of range-watershed conditions in the aspen and mountain grass vegetation types in western Colorado.

Dunford, E. G. A study of weekly soil-moisture changes on small ponderosa pine watersheds subjected to type conversion treatment.

_____. Working plan for the consumptive use of soil moisture by various grasses useful for reseeding purposes.



BIMONTHLY REPORT
Flood Control Surveys
and
Forest Influences Research
Southern Forest Experiment Station

April - May 1950

Flood Control Surveys

General

The main activity during April and May was the reformulation of program recommendations for the Upper White Report and similarly revising forestry recommendations for the SCS Lower Arkansas and Savannah River surveys. Field work was limited to the Ouachita survey on which several phases are going forward on schedule.

A highlight event was the regional conference dealing with FCS procedures and policies which was held in New Orleans April 12 and 13. Participating were SCS representatives from Spartanburg and Fort Worth and the Station's FCS staff. Representing the Washington office was Mr. Williams, the Department's recently appointed Flood Control Surveys officer; Munns and Lassen of FS; and Wells and Brown of SCS. The conference clarified many matters affecting completion and early submittal of current FCS reports and developed group understanding of new guiding policies and procedures.

Meginnis spent most of the period in Washington preparing the FS report for the Arkansas-White River Basin pursuant to a request from the President's Water Resources Policy Commission for USDA reports on some 12 major drainages.

Hobba transferred to flood control surveys work at the Pacific Northwest Station effective April 30.

Upper White Revision

The job of revamping recommended measures for the Upper White Report has involved many difficulties and has required numerous conferences with Federal and State officials in Missouri and Arkansas. Early in April Meginnis and Stephenson conferred with officials of PMA and Extension Service in Missouri; with State Forester White; and with Professors Krusekopf and Westfeldt of the University. Purpose of these discussions was to reconcile survey estimates as to quantities and costs of proposed measures with those of the respective agencies and to solicit additional data on costs and rates of accomplishment of going programs. Early in May Stephenson and Davey participated in a joint follow-up meeting with PMA and Extension Service officials from Arkansas and Missouri to harmonize the various estimates.

Stephenson and Langdon on April 18 and 19 conferred with State Forester Lang on various matters including forestry recommendations for the Upper White watershed. Participating from Region 8 were Assistant Regional Foresters Albert and Bryan, Lawrence Newcomb and Supervisor Gerrard. Prior to this discussion, the Station and Region reviewed acquisition needs in several areas under survey, including the Upper White, and agreed on recommendations which will be incorporated in the several reports.

One matter which has occasioned some difficulty is the deficiency in sedimentation data for use in gauging prospective losses in storage capacity for large authorized and proposed reservoirs in the Upper White Basin. Data from a 1948 sedimentation survey of the Lake of the Ozarks, obtained recently from the Union Electric Company in St. Louis, affords a strengthened basis for the Upper White estimates. The survey indicates an annual sedimentation rate of about 46 acre feet per hundred square miles of drainage area. This compares with 62 acre feet as ascertained in an earlier survey made about 1940. Whether the data indicate a declining rate is problematical since survey methods are rough and approximate, but there is some reason to anticipate this because of evident improvement in watershed conditions during the last 10 or 15 years.

Work is going forward on revision of the Upper White report and appendixes with a view to submitting this to Washington for review on or soon after July 1.

Ouachita Survey

Shoulders and Freese from the Ozark and Birmingham branch stations completed the forest land classification survey early in May. This involved field sampling of forest lands to ascertain hydrologic condition and to obtain related data on soil and cover, fire occurrence, etc. The survey shows only about 6 percent of the basin's forest lands in good hydrologic condition based on litter and humus development and forest soil characteristics.

This field study also provides useful and significant data on prevailing depths of mineral soil in the Ouachita Mountain area. One view has been that these mountain soils are shallow and rocky and hence have exceedingly limited capacity for water storage. In fact, SCS has consistently regarded the Ouachita Mountains as an area of "skeletal" soils where there are little or no hydrologic benefits from land treatment or cover improvement. Numerous soil borings in the recent study for samples which are applicable to a major part of the mountain area in the Ouachita River Basin indicate that 66 percent of the total area has soils 20 inches or more in depth and only 5 percent is classified as shallow (i.e., 10 inches or less).

The field phase of floodplain studies was also substantially completed during the period. This involved mapping sedimentation and scour damage on valley lands, and establishment of valley cross sections for use in relating flood stages to areas inundated. The work was handled

largely by Engineering Aides detailed from SCS and supervised by Hobba and Gammage. Comparatively little floodplain damage was found in the survey, particularly in the Coastal Plain where the valley lands are still mostly in woods and largely undeveloped for agriculture.

Also completed was a reconnaissance reservoir sedimentation survey of Lake Hamilton and Lake Winona. This is being handled as a part of the Ouachita flood control survey by Dr. Victor Jones and Engineering Aid Ogle detailed from the Fort Worth SCS office. Larson also assisted in this work.

Purpose of the Lake Winona survey is to obtain additional data indicative of sedimentation rates from relatively well-protected watersheds. This Lake supplies the water for the City of Little Rock and most of its 40-square mile watershed is within the Ouachita National Forest. An initial survey, made about 10 years ago, indicates a sedimentation rate of about 59 acre feet per 100 square miles which seems unduly high for a predominantly forested watershed.

Homochitto-Buffalo Survey

Further work on this project has had to be deferred repeatedly pending completion of the Upper White and other higher priority jobs. The remaining work involves recasting program recommendations and preparing a report and appendix. Through correspondence the Production and Marketing Administration has been informed of the status of the project and advised of our need for information on probable rates of accomplishment and cost of flood control measures.

Cooperative Relations with SCS

Work is going forward on preparation of report material and new estimates for forestry phases of the Lower Arkansas and Savannah survey reports, both of which are scheduled for early submission to Washington.

On April 28 recommendations covering new acquisition proposals for the Lower Arkansas watershed and a reappraisal of future woodland hydrologic conditions were transmitted to the Fort Worth SCS office. Acquisition recommendations were based on rather thorough field investigations last fall and winter, in which Region-8 representatives participated, and also on conference decisions in mid-April in which various aspects of the forestry recommendations for several surveys were reviewed with the Region. Various follow-up contacts were also made by Supervisor Gerrard in Oklahoma to gage local reaction of State and county officials and other interested individuals.

Langdon spent May 15 - 22 at Fort Worth working up revised estimates for the forestry phase of the Lower Arkansas Report. The remaining report material is to be furnished Fort Worth early in June.

During May 1 - 5 Spector and Newcomb (Region 8) conferred with State Foresters in Georgia and South Carolina to obtain information on the status of going forestry programs in the Savannah River watershed and

1. The first part of the paper discusses the importance of the study and the objectives of the research.

2. The second part of the paper describes the methodology used in the study and the data collection process.

3. The third part of the paper presents the results of the study and discusses the findings.

4. The fourth part of the paper discusses the implications of the study and the conclusions drawn from the research.

5. The fifth part of the paper discusses the limitations of the study and the areas for future research.

6. The sixth part of the paper discusses the contributions of the study to the field of research.

7. The seventh part of the paper discusses the acknowledgments and the references used in the study.

background information for developing estimates of tree planting, fire protection and other needs. Similar information has also been obtained through correspondence from State Forester Beichler in North Carolina. The Savannah Report is scheduled for completion July 1 and the FS contribution is due in June.

Final draft of the Grand (Neosho) Report, as subsequently revised following conferences in Lincoln and Washington, was reviewed and letter of concurrence transmitted to the Lincoln SCS office on May 16.

Forest Influences Research (Tallahatchie Branch)

A study recently completed at the Tallahatchie Branch shows interesting comparisons of litter and soil development under pine and native grass cover in North Mississippi. These observations were made in some loblolly and shortleaf pine plantations which were established as a part of the Station's early Holly Springs work.

Comparing 13-year-old loblolly and shortleaf plantations with adjacent unplanted grassland: dry weight of litter produced under loblolly was 20,080 lbs. per acre as compared to 14,167 lbs. under shortleaf and 8,872 lbs. by grass. Nitrogen content of the litter under shortleaf was found to be 1.02 percent, 0.83 percent under loblolly, and 0.71 under grass. Total calcium was found to be 0.74 percent in shortleaf litter, and 0.53 and 0.37 in loblolly and grass litter, respectively. Excess base was 76, 65 and 52 milligram equivalents per 100 grams of material for shortleaf, loblolly, and herbaceous litter, respectively. All differences were significant to the 5 percent level.

No significant differences were found in chemical composition of the surface 3 inches of soil under the different cover types, but there have been changes as shown by the development of a new A₁ horizon. Depth of this layer was 0.6 inch under the pines as compared to 0.4 inch under grass. This difference was significant to the 5 percent point.

There were also significant differences in the number of fauna. A total of 177 fauna were found per square foot of litter and 3,000 cc of topsoil underneath loblolly as compared to 149 and 82 under shortleaf and grass, respectively. (This difference had an F value of 13.64; the 5 percent point of significance is 6.94.) Fauna counted were those large enough to be seen by the naked eye which could be gathered up in litter and soil and included earthworms, threadworms, millipedes, spiders, mites, ants, springtails, bristletails, wood roaches, beetles, and various larvae.

Temperature of the top one-half of soil under the shortleaf pine was 25.8° C., barely cooler than under loblolly (26.0°) but somewhat cooler than under grass (29.1°). Temperature readings were taken simultaneously during the heat of the day in August when air temperature averaged 33.4° C.



Physical properties examined in this study in addition to litter weight, temperature, and development of a new A₁ horizon were moisture, volume weight, total solids, total porosity, small pores, large pores, and water transmission rate. Of these properties, only the difference in percentage of large pores in the top 2 inches of soil under pine approached significance when compared to the percentage of large pores under grass. The F value in this case was 7.17 or just below the 5 percent level of significance, 7.71. As this property governs to a large extent the drainage capacity of a soil it seemed probable that there should be significant differences in drainage capacity (measured as water transmission rate in inches per hour in this study). However, there were no significant differences in drainage rates of soils beneath pines and grass.

Further work is under way in this study to determine soil conditions resulting from cedar cover comparable to the pine.



BIMONTHLY REPORT
January-June 1950

Forest Influences Division
Southwestern Forest and Range Experiment Station

This report covers the major activities of the Forest Influences Division from January to June 1.

The work of the division during the past 6 months has been confined largely to cooperation with Forest Administration in evaluating watershed problems, cooperation with other agencies, preparation of manuscripts, and planning for field-season activities.

Cooperation with Administration

Discussions were had with the regional forester and several members of the regional staff concerning future studies needed in watershed management. Current information available was reviewed and plans discussed for expanding the activities of the division into the Little Colorado and Upper Rio Grande watersheds. Station personnel met with the forest supervisors during their annual meeting in Albuquerque. During the meeting many watershed-management problems and needs were reviewed. It was agreed that field inspections would be made by station personnel and the supervisors to develop ways and means of meeting some of these current needs.

Cooperation with other agencies

The Weather Bureau has been particularly cooperative in furnishing surplus rain gages for collecting precipitation at the higher elevations. An analysis of the precipitation throughout the region showed that the major portion of the precipitation stations are in the intermediate water-yielding areas, with very few records available in the high water-yielding areas. These gages will be located as near as possible in these high water-yielding areas.

Considerable precipitation data have been collected from the watersheds at Sierra Ancha. To date we have only been able to compile the information up to 1946. In cooperation with Soil Conservation Service in Albuquerque, we are now bringing our records up to date so that they may be used in evaluating watershed conditions for flood-control purposes.

A forest and range conservation course at the University of Arizona was conducted during the spring semester. Members of the division assisted in presenting the watershed-management picture throughout the United States and some of the problems and information available on the management of watershed lands for the control of sediment and production of the maximum quantity of usable water, with particular reference to southwestern conditions.

Considerable interest is being generated in the schools on the value of watersheds in our society. During the spring semester several groups of students from the Universities of Arizona and Tempe, Phoenix Junior College,

and a number of groups from outside the State visited Sierra Ancha Experimental Forest to study watershed conditions in relation to water supply. This has afforded an excellent opportunity to present the work of the station and to acquaint the students with the importance and thinking behind good watershed management.

Preparation of manuscripts

Considerable attention has been given to the preparation of a proposed Department Circular, "Surface Runoff, Sediment Yields, and Recovery of Vegetation in the Granitic Areas of Central Arizona." This manuscript is a summary of some of the oldest forest influences studies in the Southwest. The project was started in 1926 on small watersheds composed of granitic soils. The original premise of the experimental set-up was that a period of protection from grazing abuse would allow recovery of vegetation, which would in turn control excessive rates of erosion from these granitic soils. After 22 years of protection it is apparent that a much longer period of time is required for natural recovery, once the balance between vegetation and erosion is broken. Conclusions to be drawn from this study are (1) the extremely slow rates of recovery after abuse; (2) protection from all forms of abuse of those granitic areas still in good condition; (3) some aid to recovery of deteriorated areas, such as mulching, shading, or other forms of decreasing the harshness of the microclimate, in combination with reseedling, is necessary. Density of vegetation cover is reduced through loss of young seedlings, and the older plants are weakened by soil erosion and loss of moisture. The unfavorable conditions on a deteriorated site, such as lower productivity caused by loss of soil fertility, loss of clay fractions, decreased moisture-holding capacity of the soil, higher soil temperature, and increased evaporation losses accentuate drought conditions, particularly in years of below-average rainfall. Thus the struggle between natural revegetation and accelerated erosion is continually waged, with no prospect of control of erosion by natural vegetation for many years--perhaps 50 or 100 or more.

At the spring meeting of the American Society of Civil Engineers at Los Angeles, California, Mr. L. R. Rich presented a paper titled "Consumptive Use of Water by Forest and Range Vegetation." This paper was part of a symposium which included the use of water on irrigated areas, use of water along river systems, and use of water by municipalities. The inclusion of consumptive use of water by forest and range vegetation shows the interest that is being manifested throughout the West in upper watershed lands. At Sierra Ancha, the ability of plants to grow and use water is greatest in the summer and least in the winter. Actual use of water is dependent on growing conditions when moisture is available, which depends on distribution of precipitation and moisture held in the soil for use during drought periods. Water use in the semidesert grassland zone varied from 92 percent of the precipitation for perennial grasses, 98 percent for winter annuals, and 89 percent of the precipitation lost from bare soil by evaporation. Consumptive use of water in the chaparral zone varied from 81 percent of the precipitation for grasses, 84 percent for shrubs, and 78 percent of the precipitation lost from bare soil by evaporation. Use of water from forested watersheds has varied from 77 to 90 percent of the precipitation, depending on the depth of soil and the degree of slope. Vegetation or evaporation from bare soil can more than use all the summer precipitation in the Southwest. Use of water by vegetation during the

winter periods depends on the growing conditions. The consumptive use by forest and range vegetation in the Southwest depends on the amount and distribution of precipitation, climate, topography, and the storage capacity of the soils of a watershed, as well as the type of vegetation and the degree to which the use overlaps the period of winter water surplus.

In addition to the paper presented by Mr. Rich, a manuscript is being prepared for Department publication on the use of water by forest and range vegetation in the desert grassland and chaparral zones in southern Arizona.

A popular leaflet "Watershed Research on the Sierra Ancha Experimental Forest" is being prepared for distribution to the general public. This will present the aims of and information available on the experimental forest.

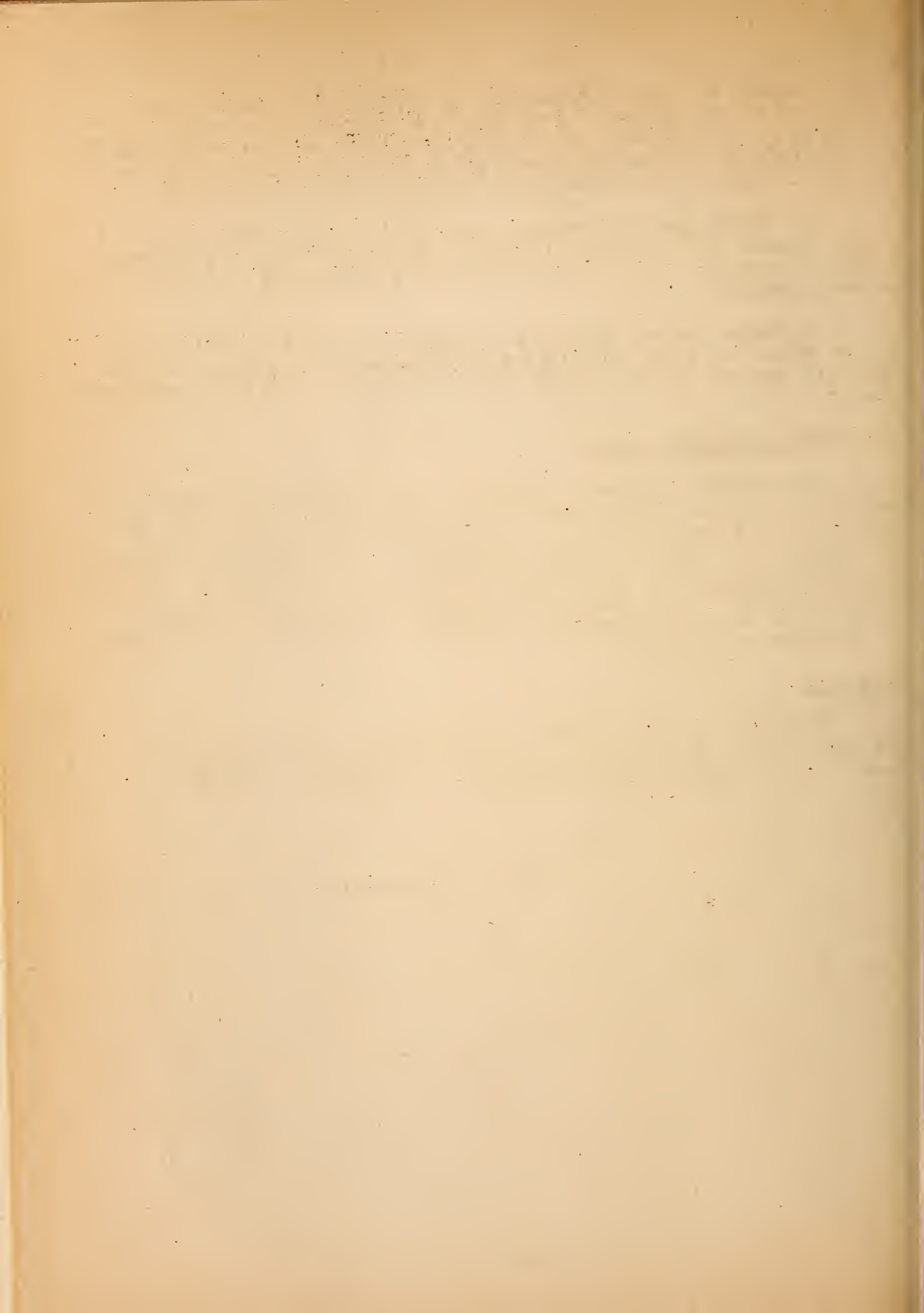
Preparation for field season

Considerable calibration data have been collected on a number of watersheds at Sierra Ancha. These data are being reviewed and plans are being developed for the collection of additional data needed prior to the treatment of several of these watersheds. It is planned that during the field season, timber and vegetation surveys will be completed and Colman moisture elements installed which will enable us to follow the changes that take place during the treatment of several of the watersheds on the experimental forest.

Personnel

Mr. Dwight R. Cable reported to the division on April 17, 1950. Mr. Cable has had considerable experience with the SCS in conservation work. He is a range-management graduate of the University of Idaho.

H. C. FLETCHER





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